

A NEW HEDGE-NETTLE (*STACHYS*: LAMIACEAE)
FROM THE INTERIOR HIGHLANDS OF THE UNITED STATES,
AND KEYS TO THE SOUTHEASTERN SPECIES

John B. Nelson

A. C. Moore Herbarium
Department of Biological Sciences
University of South Carolina
Columbia, South Carolina 29208, U.S.A.

ABSTRACT

A new and geographically restricted species in the “hedge-nettle” genus, *Stachys* (Lamiaceae), is described from the Interior Highlands of the United States, as ***Stachys iltisii***, from Arkansas and Oklahoma. Two keys are provided for distinguishing the Southeastern hedge-nettles.

ZUSAMMENFASSUNG

Eine neue Art in der Ziest-Gattung (*Stachys*, Lamiaceae), mit kleinräumiger Verbreitung im Inneren Hochland von Arkansas und Oklahoma, wird beschrieben: ***Stachys iltisii***. Zwei Schlüssel dienen zur Bestimmung der Ziest-Arten aus der südöstlichen USA.

Stachys is one of the larger genera within the Lamiaceae, comprising nearly 300 species, and nearly cosmopolitan, absent from Australasia. Its centers of species diversity include warm-temperate portions of western Asia and the Mediterranean, southern Africa, and portions of North and South America (İlçim et al. 2008). The genus in North America, north of Mexico, contains about 45 species, particularly concentrated west of the Rocky Mountains (especially the Pacific states) and in the east, along the Atlantic seaboard states and in the Appalachian region. Southeastern species occur in a wide variety of habitats, most often in mesic sites, and at a broad range of elevations. The North and South American species were studied in detail by Epling (1934); Mulligan and Munro (1989) provide a comprehensive assessment of the North American taxa north of Mexico. Ongoing studies in the genus show that an additional species should be recognized.

Stachys iltisii J. Nelson, sp. nov. (**Figs. 1–3**). TYPE: UNITED STATES. ARKANSAS. Logan Co.: crowded population on rocky ground in thin woods remnant, S side of Lodge Drive, 1.5 mi (2.4 km) W of AR Highway 309, near top of Magazine Mountain, 18 Jun 2007, J.B. Nelson 26650 (HOLOTYPE: USCH; ISOTYPES: APCR, BRIT, F, FSU, NCU, NY, OKL, OKLA, STAR, UARK, US, WIS).

Species propria, haec planta est abundanter glandulifer-pubens in lateribus caulium et in angulis, atque folia pubentissima sunt. Caules et folia, contusi, redolent muschate. Est similis *S. eplingii*, sed differt quod habet maiora aliquanto tenuiora folia quae inferiore pagina tam glandulifera non sunt, et quod habet flores paulo minores, haec plerumque compactiora in verticillis aggregatis. Crescit in Oklahoma et Arkansas.

Potentially robust perennial **herbs** to 1 m tall or taller from vigorous, pale, fragrant rhizomes, often in dense colonies; **stems** erect, occasionally branched, older plants commonly branched; stem sides and angles densely pubescent with a mixture of glandular and eglandular hairs, the glandular hairs capitate, the eglandular hairs with 3 or more cells, to 3 mm long, spreading and reflexed; **leaves** spreading, somewhat lax, densely pubescent on both surfaces with glandular and eglandular hairs, the latter mostly appressed on upper surface, and erect on lower surface, the lower surface equipped as well with scattered sessile (or nearly sessile) capitate glands; the crushed leaves with a musky walnut-spice-fish scent; mid-stem leaves 4–6 cm broad, 10–17(–19) cm long, commonly lyrate basally, featuring a somewhat narrowed waist, with distally convex margins; **inflorescences** commonly elongated at maturity (fruiting), the lowest and oldest several verticils usually slightly separated, the more distal and younger verticils more or less crowded together, thus nearly compact; **cymules** each with 6–8-flowers, the verticils thus 12–16-flowered, mostly (turbinate)-hemispheric to nearly spherical; open flowers are visited by a variety of insects, including hon-

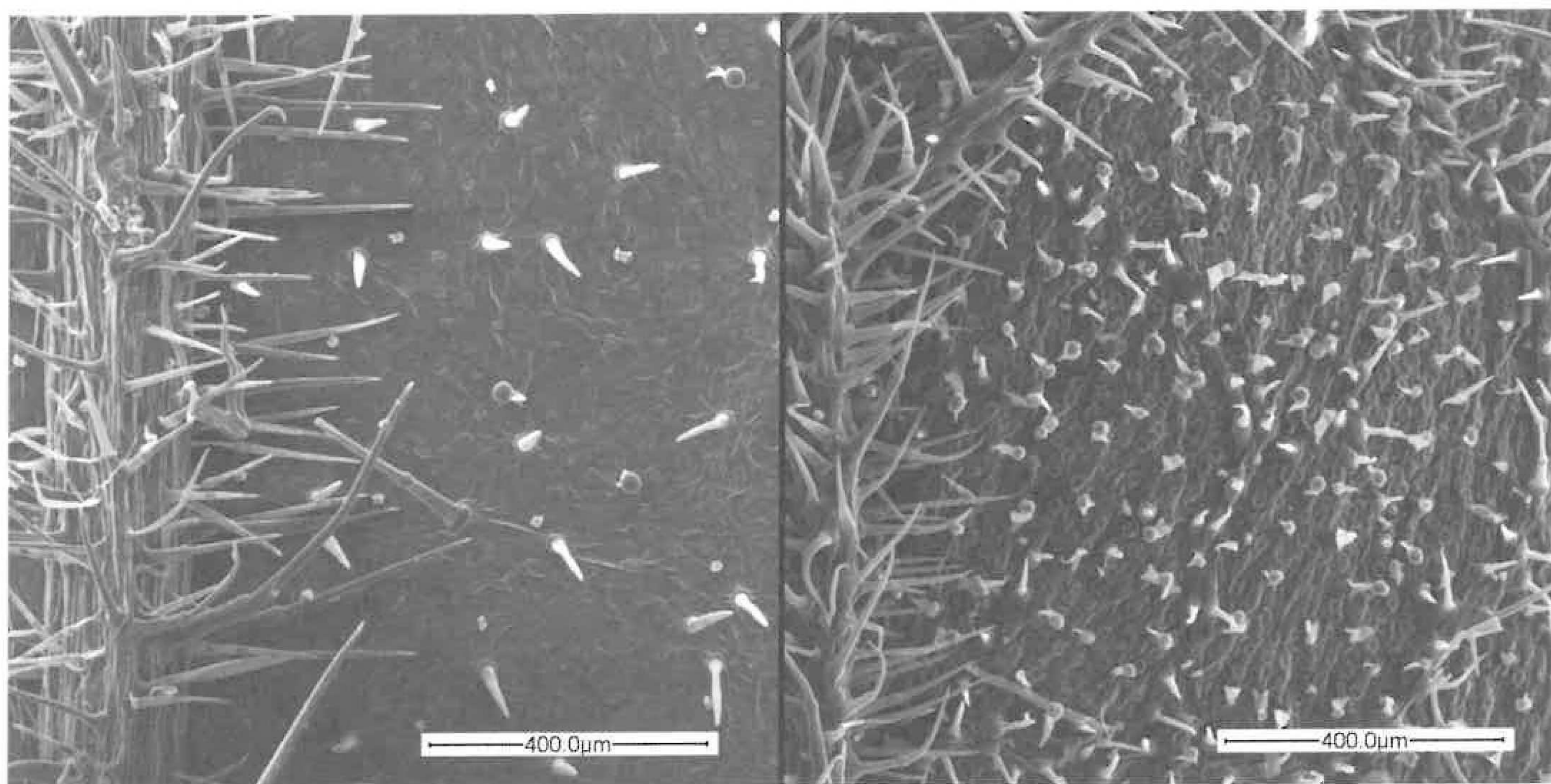


FIG. 1. Lower (abaxial) leaf surface SEM images of *Stachys iltisii* and *Stachys eplingii*: comparative surface features along midvein of midstem leaves; same scale for both images. LEFT: *Stachys iltisii* (J. Nelson 26653, LeFlore County OK, USCH) showing few glandular hairs. RIGHT: *Stachys eplingii* (H. Allard 19940, Fauquier County VA [paratype from type locality], WVA) showing abundant glandular hairs.

eybees, small bumblebees, and wasps; **calyces** campanulate, densely pubescent with glandular and eglandular hairs, tube (3.2–)3.8–4 mm long, the lobes less than one-half the length of the tube, 1.5–2 mm long, deltoid, minutely apiculate; **corollas** pink, 11–11.5 mm long from base to tip of galea, galeae frequently notched or indented apically; the lower lip generally declined 90° at full anthesis, more so with age, 6 mm long, featured prominent pink-purple blotches and spots on adaxial surface; corolla tube prominently saccate toward base on lower side, internally glabrous, but with prominently slanting (oblique) annulus, this copiously pubescent with soft, bulbous trichomes; **mericarps** 1.5 mm wide, 1.5–1.6 mm long, dark brown, irregularly and minutely verrucose.

Additional specimens seen: **UNITED STATES. ARKANSAS: Crawford Co.:** S. Burgess 102, McMinn Gap, Forest Service Rd 1003 (UAM, UARK). **Franklin Co.:** L. Kirschberger 109, 14 Jun 1996, Ozark National Forest (UAM). **Garland Co.:** D. Demaree 56064, 30 May 1967, rocky hillsides on Hickory Nut Mountain (BRIT); and same location and date, Demaree 56078 (ISC). **Izard Co.:** F. Pennell 10686, 1 Jun 1920 (NY). **Logan Co.:** D. Demaree 17743, 18 Jun 1938, Magazine Mountain (BRIT, FSU, WVA); H. Iltis 5048, 17 Jun 1954, Magazine Mountain (UARK); H. Iltis 5374, 9 Jun 1955, ravine on N slope of Magazine Mountain (BRIT, GH, WIS); E. Palmer 23214, 11 Jun 1923, slopes of Magazine Mountain (MO, UARK); H. Pyle 796, 15 Jun 1937, Magazine Mountain (UARK); G. Tucker 15499, 23 Jul 1979, Magazine Mountain, 1.5 mi W of Green Field (APCR); G. Tucker 22898, 10 Jul 1983, Magazine Mountain (UAM). **Montgomery Co.:** D. Demaree 45661, 10 Jun 1962, Hickory Nut Mountain (GH); J. Miller 187, 24 Jun 1970, road on High Peak (BRIT, UARK); J. Roberts 273, 26 May 1977, Winding Stairs, E side of Little Missouri River (UARK); E. Sundell 2351, 28 May 1981, Little Missouri Falls (FLAS, NLU, UAM, UARK); R. Thomas 100517, 27 Jun 1987, Collier Springs (NLU); **Newton Co.:** A. McWilliam 25, 19 Jun 1969, roadside between Kingston and Boxley (UARK). **Perry Co.:** S. Walker s.n., 8 Jun 1995, N side of Cedar Creek (UARK). **Polk Co.:** D. Demaree 23183, 13 Jun 1942, Rich Mountain (BRIT, GH, MIN); D. Demaree 54519, 19 Sep 1966, Rich Mountain (BRIT); H. Iltis 5175, 20 Jun 1954, Jackfork sandstone, 8 mi W of Mena (UARK); A. McWilliam 482, 1 Jul 1955, 9 mi W of Mena (UARK); J. Nelson 26652, Rich Mountain, 0.65 mi E of Queen Wilhelmina State Park at AR Hwy#272 (NBYC, UARK, USCH); J. Nelson 26654, 19 Jun 2007, Rich Mountain at Pioneer Cemetery, 3 mi E of OK state line (CLEMS, STAR, USCH); J. Nelson 26655, 19 Jun 2007, Rich Mountain fire tower, 2 mi E of AR Hwy#272 (APCR, FMUH, USCH); J. Nelson 26657, 20 Jun 2007, shady woods along Mine Creek, 2.5 mi E of Shady (town) (USCH); J. Nelson 26658, 20 Jun 2007, shady woods next to stream, 4.1 mi E of Shady (town) on AR Hwy #25 (USCH). **OKLAHOMA: LeFlore Co.:** M. Hopkins 574, 21 May 1944, meadow at base of Rich Mountain (OKL); J. Nelson 26653, 19 Jun 2007, 1.25 mi W of AR state line on OK Hwy #1 (OKL, OKLA, USCH); E. Palmer 20615, 23 Sep 1921, wooded slopes of Rich Mountain (F, NY); E. Palmer 21642, 1 Jun 1922, N slopes of Rich Mountain (NY); U. Waterfall 17005, 31 May 1962, 10 mi SE of Stapp near Arkansas border (OKLA); F. Means, Jr. 3571, 15 Jun 1968, N slope of Rich Mountain, 0.25 mi W of Arkansas border (OKLA); J. and C. Taylor 32462, 12 Aug 1984, State Hwy #1, 6.8 mi E of its

junction with US 259 (BRIT). **McCurtain Co.:** *G. Goodman* 8360, 11 Jun 1973, S end of Beaver Bend State Park (OKL); *M. Hopkins* 380, 20 May 1944, Beaver Bend State Park (OKL).

Stachys iltisii is endemic to the Interior Highlands of Arkansas and Oklahoma. The oldest known collection is that made by E. J. Palmer in 1920, from Izard County, Arkansas, which represents the eastern-most location for this plant. Its first recognition in the literature was made by Epling (1934), who considered it, additionally known by then from collections in Oklahoma, as a thin-leaved and unnamed variant of *Stachys nuttallii* Shuttlew. ex Benth. Fernald (1950), despite considerable disagreement with Epling's assessments on *Stachys* in general (1943), concurred that the plants of the Interior Highlands belong in *S. nuttallii*, as did Gleason (1952). Hugh Iltis (WIS) by way of annotation on the original label of his #5374 (BRIT) from Magazine Mountain, Logan County, AR on 9 Jun 1955, suggested that these plants rightly constitute a recognizable entity within *S. nuttallii*, offering "ssp. nov. *arkansanus*" for it. Nelson and Fairey (1979) essentially concurred with Epling in recognizing these plants as distinctive within the *S. nuttallii* complex, but maintained them as being a part of a distinctive and new taxon, *S. eplingii*; they treated the plants of the Interior Highlands as forming the western (and disjunct) end of the range of *S. eplingii* (the eastern distribution consisting of primarily Appalachian portions of West Virginia, Virginia, Maryland, District of Columbia, and historically, North Carolina). The somewhat conservative approach to the taxonomic status of these plants taken by Nelson and Fairey at the time is evident within the protologue of their description of *S. eplingii*: they list (1979, p. 493) three specimens from Arkansas as paratypes for *S. eplingii* (*Demaree* 17743 from Logan County; *Miller* 187 ... "Smith" was used for this collection, but in error... from Montgomery County; *Iltis* 5175 from Polk County). Their listing these paratypes for a different taxon has no bearing on the matter at hand, and these three collections presently serve as paratypes for *S. iltisii* (see above).

This taxonomic position was maintained by Nelson (1981), and by Mulligan and Munro (1989; whose formulation is the most recent treatment for all the North American species of *Stachys*), by Gleason and Cronquist (1991), and finally by Smith (1994).

Recent field investigation in Arkansas and Oklahoma (during one of the hotter and stormier, lightning-filled summers on record, 2007) and study of considerably more herbarium material since 1979 reveals that the opinion expressed by Epling and Iltis was legitimate, at least in the sense that the plants of the Interior Highlands are distinctive within the *S. nuttallii* "complex." There is no question that these plants share many features with *S. eplingii*, and the two entities are surely related. Substantial differences between these two species are apparent, and based on more recent collections, it is obvious that the two taxa can be consistently separated, both from fresh material, and from herbarium specimens. Both species bear short-stalked, capitate glands on the abaxial leaf surface, with unicellular, spheroidal heads, 25–30 μm in diameter. The lower leaf surface of *S. iltisii* is sparingly glandular, while that of *S. eplingii* is densely and prominently atomiferous-glandular (Fig. 1), to the point of having a somewhat shiny, golden surface (with magnification) below the non-glandular pubescence, as well as often leaving something of a yellowish, slightly oily stain on newspapers when pressed. The leaf blades of *S. iltisii* are longer, broader, and somewhat thinner in texture than those of *S. eplingii*. Additionally, the leaf blades of *S. iltisii* are frequently somewhat narrowed in the lower third, thus somewhat lyrate, and widest toward the middle. *Stachys eplingii* has more ovate leaves, usually widest in the lower third. In *S. iltisii*, the apex of the early blooming stem is relatively delicate and somewhat flexuous, while that in *S. eplingii* is stiffer. The fruiting inflorescence of *S. iltisii* is commonly compact, 1.5–2 cm between the lowest verticils, whereas that of *S. eplingii* commonly exhibits more space, (2–)3–4 cm between the lowest verticils.

Stachys eplingii is found in boggy places within the Appalachians. Its most common habitat from West Virginia into northern Virginia includes wet, saturated meadows. *Stachys iltisii* is generally found in upland forested habitats, commonly on thin soil of rocky places, in both the Ozark Plateau and the Ouachita Mountains, thus on both sides of the Arkansas River Valley, though probably more widely distributed in the Ouachitas. Although substantial differences in geology and soil types exist between the Ozark Plateau and the Ouachitas, sites occupied by *S. iltisii* do not appear to be unusual or particularly special, and in fact,



FIG. 2. County distribution of *Stachys iltisii* in Oklahoma and Arkansas.

open roadsides tend to make excellent habitat for it, where it frequently grows with weedy plants such as *Coronilla varia*, *Daucus pusilla*, and *Ambrosia trifida*. Common woody associates, in less disturbed sites include *Quercus alba*, *Acer rubrum*, *Robinia pseudo-acacia*, *Juglans nigra*, *Ostrya virginiana*, and *Sassafras albidum*. Nearly every population located during this field effort grew with *Toxicodendron radicans*, *Parthenocissus quinquefolia*, and *Rubus occidentalis*.

An overview of biological endemism in the Interior Highlands is not the purpose of this paper. This subject has been amply addressed for a considerable number of plants and animal species, and is discussed in the recent literature; Robison and Allen (1995) provide a useful summary. Zollner et al. (2005) provide an enumeration of the vascular plant taxa endemic to the Interior Highlands (24 species plus 12 subspecies or varieties of more widely distributed species). Vicarious distributions of plant taxa between the Interior Highlands and the Appalachians have been long recognized: Steyermark (1934) lists 87 vascular taxa of the Ozark Plateau that also occur in the southern Appalachians. "Classic" examples include the distributions of *Magnolia tripetala*, *Cladrastis lutea*, *Robinia pseudo-acacia*, and perhaps *Halesia carolina* (Little 1970). The common notion regarding disjunction of the same species, or of two related species, presumes some probable interconnection in the past (Hardin & Cooper 1967), followed by potential evolutionary divergence. Vicariance and subsequent speciation has been demonstrated for fish species forming species "pairs" in the Ozarks and the Appalachians (Strange & Burr 1997), and various examples exist for vascular plants, such as *Castanea ozarkensis* and *C. pumila*. In the case of *Stachys iltisii* and *S. eplingii*, such potential commonality of distribution no longer exists, and the two entities are now fully separated. Approximately 1000 km (640 mi) currently separate their nearest points of distribution. Based upon the isolation of the plants within the Interior Highlands from all other related hedge-nettles, and upon the ease of separating plants based on simple morphology, *Stachys iltisii* is here recognized and described at the level of species.

Personnel within the Arkansas Natural Heritage Commission (2005) list *Stachys iltisii* as *S. eplingii* (thus following Nelson & Fairey 1979), and have assigned its state rank as "INV" (Inventory Element, "of conservation concern"). The Oklahoma Natural Heritage Inventory (2003) similarly maintains *S. iltisii* as *S. eplingii*, tracking it as a rare species. At least 40 known populations are verified for 13 counties in Arkansas and Oklahoma. Reports of additional county occurrences in Arkansas (Howard and Scott Counties) but not on specimens seen from them, is consistent with the known range (Fig. 2).

Reference to this species as an element of the flora of the Southeastern United States comes from its presence in Arkansas, a politically delimited area generally recognized by botanists as a portion of the

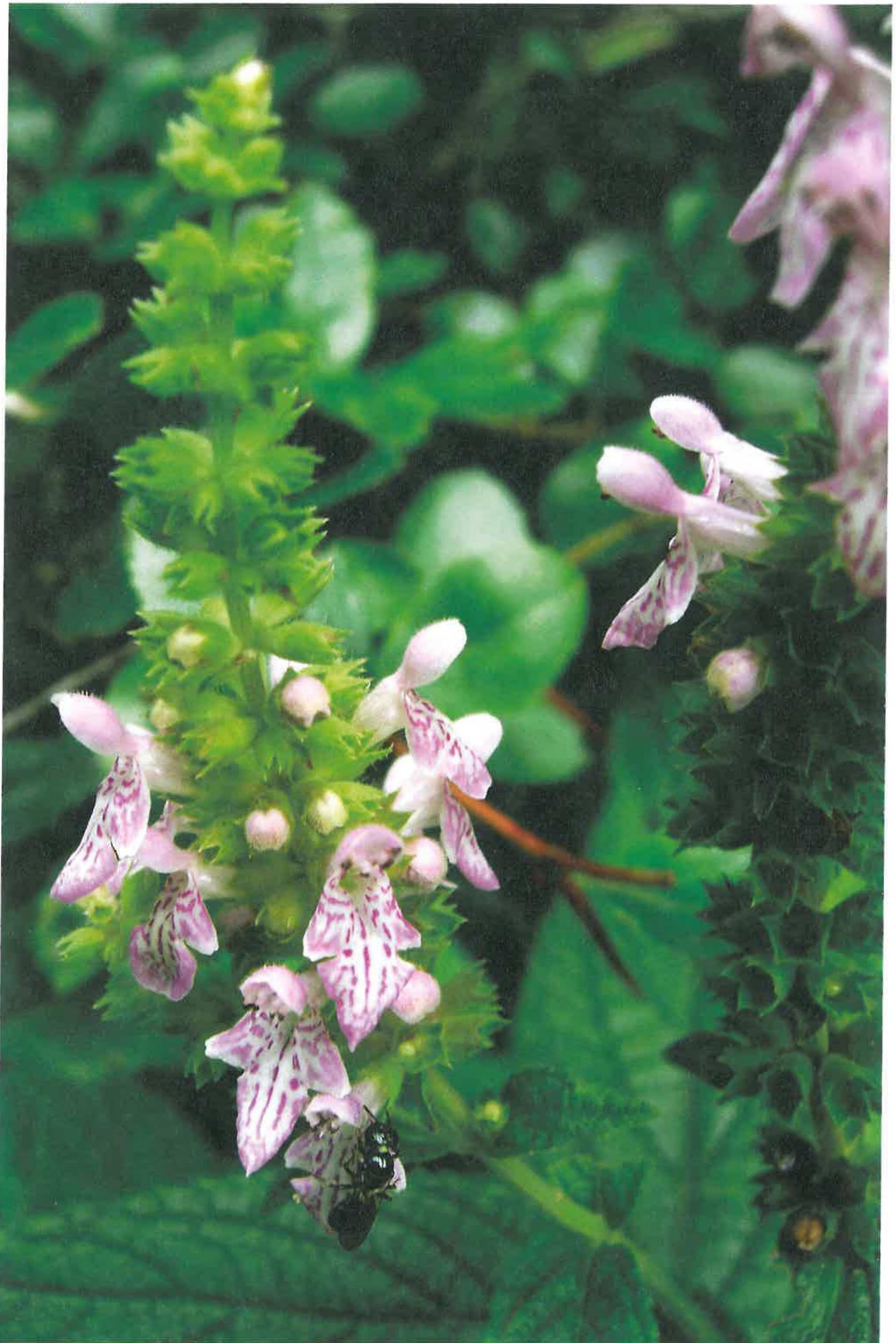


FIG. 3. *Stachys iltisii*: living plants (population of Nelson 26653, LeFlore County OK) with unidentified pollinator (?) at lower left.

“Southeast.” Although Oklahoma is not a Southeastern state, its eastern portions do indeed harbor many “Southeastern” species.

“Ozark hedge-nettle” may be an appropriate common name. This is a handsome species, often robust and conspicuous (Fig. 3), and fairly easy to spot from a moving vehicle. Due to their tendency toward a somewhat compact inflorescence, especially in the sun, the plants do resemble *Teucrium canadense*...but then, various *Stachys* species are commonly confused with “Canada germander,” frequently causing field-trip turn-arounds.

Etymology.—Iltis’ unofficial differentiation of this plant as a new taxon deserves recognition. Its occurrence in Oklahoma as well as Arkansas, however, makes the choice of the epithet “*arkansana*” (*Stachys* as a noun requires a feminine ending) unwarranted. As a way of commemorating Hugh Iltis’ interest in the vegetation of the Interior Highlands, and in the genus *Stachys*, and as well acknowledging his tremendous contributions to botany, this taxon is thus named in his honor.

Except that *Stachys iltisii* and *S. eplingii* are (were?) never really common, and that there is a relatively low number of historic collections of each, it is somewhat remarkable that Epling (1934) did not consider formally recognizing them in 1934. On the other hand, *Stachys* in the Southeastern United States has commonly been considered a troublesome genus. Its current taxonomy is fairly stable, although several of the characters (e.g., stem pubescence, petiole length, and calyx lobe dimensions) useful in separating taxa are variously continuous. The considerable variation in some species groups suggests future usefulness to be attained from cytological and breeding system studies.

Nevertheless, practical taxonomy demands results. To this end, two keys are provided for distinguishing *Stachys iltisii* from the other Southeastern species. The first uses relative petiole length as a primary distinction, the second using shape of the calyx lobes. The different structuring of these keys is provided to emphasize different characters; with a particular plant or specimen in hand, the user may find that one or the other key provides the easier route to identification.

SOUTHEASTERN STACHYS: KEY #1

1. Annual; corolla scarcely exerted from calyx; LA-MS-AL-FL-SC _____ **S. agraria**
1. Perennial; corolla prominently exerted from calyx, widespread.
 2. Petioles obvious (at least some of those in the middle portion of the stem at least 1/5 as long as the leaf blade).
 3. Calyx tubes glandular.
 4. Leaf blade margins dentate or nearly so; stem angles copiously pubescent with long (to 3 mm), spreading hairs _____ **S. clingmanii**
 4. Leaf blade margins mostly crenate; stem angles glabrate or pubescent with mostly short, retrorse hairs.
 5. Leaf blades <3 cm wide; plants perniciously weedy, commonly in dense patches, scarcely to .75 m tall, with white, rounded tubers terminating rhizomes _____ **S. floridana**
 5. Leaf blades commonly >3 cm wide; plants not weedy, never in dense patches, commonly 1 m tall of greater; rounded tubers absent.
 6. Leaf blades ovate, the bases cordate; margins crenulate; IN-OH-WV-KY-VA _____ **S. cordata**
 6. Leaf blades elliptic-oblong, the bases rounded to slightly cordate; margins crenate to serrate; KY-TN-GA-AL-SC _____ **S. nuttallii**
 3. Calyx not glandular, or very slightly so.
 7. Calyx glabrous to sparsely pubescent; petioles well-developed, especially in shade forms _____ **S. tenuifolia**
 7. Calyx variously hairy, but at least hispidulous, frequently strongly hispid; petioles short or long.
 8. Petioles usually well developed; stem angles abundantly pubescent with spreading hairs; blade margins commonly dentate _____ **S. clingmanii**
 8. Petioles short to nearly absent; stem angles commonly pubescent, with retrorse hairs; blade margins serrate, but not dentate _____ **S. hispida**
2. Petioles short (the midstem leaves with petioles less than 15mm) or absent.
 9. Leaves linear-lanceolate to narrowly lanceolate, usually widest at or near the base; leaf margins entire to crenulate, rarely serrulate, and then mostly toward the apex.

- 10. Leaf blades abundantly pubescent below with appressed hairs, thus closely tomentose, the lower surface felty or velvety; corolla white, pink, or purplish.
 - 11. Stems angles and sides abundantly soft pubescent, with mostly soft, spreading hairs, corolla white; rare adventive (SC) _____ **S. pilosa**
 - 11. Stem angles and sides abundantly pubescent, the angles equipped with at least some stiff, retrorse hairs, corolla purple; rare adventive (AL) _____ **S. palustris**
- 10. Leaf blades variously pubescent or glabrate, but never felty or velvety; corolla pink.
 - 12. Leaf blades narrow, 3–6 mm wide; plants generally glabrous to moderately pubescent; blade margins entire to obscurely crenulate _____ **S. hyssopifolia**
 - 12. Leaf blades broader, 5–8 mm wide; plants frequently hispidulous or at least moderately pubescent, or abundantly hairy; blade margins crenulate to serrulate _____ **S. aspera**
- 9. Leaves ovate to elliptic, widest near the center or toward the apex, oblong; leaf margins crenate to sharply serrate for nearly the entire length.
 - 13. Stem sides commonly pubescent above.
 - 14. Calyx lobes lanceolate; flower 6 per verticil; leaf margins serrate-crenate.
 - 15. Leaves generally subsessile, the petioles thick, not longer than 6mm; blades densely pubescent, frequently soft-pilose to scaberulous; leaf margins serrate; introduction from farther north and west (VA) _____ **S. arenicola**
 - 15. Leaves generally petioled up to 15mm long, although commonly shorter, and relatively slender; blades pubescent on both surfaces, but never to the point of being pilose or scaberulous; leaf margins crenate-serrulate; KY-TN-GA-AL-SC _____ **S. nuttallii**
 - 14. Calyx lobes deltoid; flowers 8 or more per verticil; leaf margins crenate-crenulate; native s with bipolar distribution, OK-AR, WV-MD.
 - 16. Lower leaf surface densely sessile- and stipitate-glandular, blades ovate, widest in lower third of leaf; adjacent upper verticils separated in fruit; WV-VA-MD-DC (NC) _____ **S. eplingii**
 - 16. Lower leaf surface glandular, but not densely so; blades elliptic-ovate, widest at middle; adjacent upper verticils commonly crowded in fruit; OK-AR _____ **S. iltisii**
 - 13. Stem sides glabrous, the angles pubescent.
 - 17. Fruiting calyx lobes lanceolate, hispidulous to hispid, about half as long as the calyx tube _____ **S. hispida**
 - 17. Fruiting calyx lobes deltoid or triangular, shorter than half the length of the calyx tube.
 - 18. Leaf margins sharply serrate, nearly always with sharp teeth; bracts gradually reduced upward from lowest flowering node, leaf blades elliptic, rounded to truncate at base; Blue Ridge (VA) _____ **S. subcordata**
 - 18. Leaf margins serrate to crenate; teeth often more rounded; bracts abruptly reduced upward from lowest flowering node; leaf blades oblong-elliptic; Blue Ridge to upper piedmont, VA-NC-TN-SC-GA _____ **S. latidens**

SOUTHEASTERN STACHYS: KEY #2

- 1. Fruiting calyx lobes deltoid to broadly triangular, mostly <1/2 tube length.
 - 2. Stem sides pubescent; foliage glandular, often with musky scent when crushed.
 - 3. Petioles short to absent, blades mostly rounded to truncate-cordate.
 - 4. Lower leaf surface densely glandular, with atomiferous/short-stipitate golden glands; blades prevailing ovate, broadest toward base; WV-VA-MD (NC) _____ **S. eplingii**
 - 4. Lower surface glandular, but not densely; blades prevailing elliptic, somewhat lyrate toward base, broadest toward midblade; AR-OK _____ **S. iltisii**
 - 3. Petioles well developed, blades commonly cordate at the base.
 - 5. Top of blooming stem frequently flexuous, somewhat lax; blades ovate-rounded, IN-OH-WV-KY-VA-NC _____ **S. cordata**
 - 5. Top of blooming stem stiffish, not lax; blades oblong-elliptic; KY-TN-GA-AL-SC _____ **S. nuttallii**
 - 2. Stem sides glabrous; crushed fresh foliage with grass-like scent, not musky.
 - 6. Leaves sessile to subsessile; bracts rapidly reduced upward (Appalachians, GA-WV) _____ **S. latidens**
 - 6. Leaves subsessile or petioles to 10mm long; bracts gradually reduced upward (Blue Ridge, VA) _____ **S. subcordata**
- 1. Fruiting calyx lobes lanceolate, narrowly triangular, or nearly subulate, half as long as tube (or > 1/2 as long).
 - 7. Leaf blades linear to lanceolate.
 - 8. Corolla white; stem sides with at least moderate pubescence on the highest sterile internode, moderately to densely pubescent on higher internodes; lower leaf surface abundantly pubescent to velvety-pilose (SC) _____ **S. pilosa**

8. Corolla pink; stem sides without pubescence, except for internodes within the inflorescence, which may bear light villous or glandular hairs; lower leaf surface glabrous or pubescent, but not velvety.
9. Leaf blade margins entire to crenate; plants generally glabrous _____ **S. hyssopifolia**
9. Leaf blade margins serrulate with at least a few teeth; plants glabrous or pubescent.
10. Stems strict or sparingly branched; leaves sessile or barely petioled, the blades crenate to serrate with shallow teeth _____ **S. aspera**
10. Stems frequently branched from the upper nodes; leaves obviously petioled, the blades sharply toothed _____ **S. tenuifolia**
7. Leaf blades wider, rounded, oblong to elliptic.
11. Petioles poorly developed, essentially absent.
12. Upper stem sides glabrous _____ **S. hispida**
12. Upper stem sides variously pubescent, glandular and/or eglandular.
13. Corollas purple; rare adventive (AL) _____ **S. palustris**
13. Corollas pink; native species.
14. Blades copiously pubescent, scabrous to merely felty; rare in SEUS, adventive in VA from north and west _____ **S. arenicola**
14. Blades pubescent, but never scabrous or felty; higher elevations, KY-TN-GA-AL-SC _____ **S. nuttallii**
11. Petioles obvious, frequently 1/5 the length of the blade.
15. Leaf blades dentate or sharply dentate; stem angles abundantly pubescent with spreading or somewhat retrorse, long (to 3 mm) hairs _____ **S. clingmanii**
15. Leaf margins crenate to serrulate, but never dentate; stem angles glabrous or pubescent (if the latter, then with scattered, stiffish, retrorse hairs).
16. Annual; corolla scarcely exerted from calyx; LA-MS-AL-FL-SC _____ **S. agraria**
16. Perennial; corolla prominently exerted from calyx; widespread.
17. Plants commonly glandular on stems, leaves, and within inflorescence.
18. Plant producing thick, segmented, tuber-like rhizomes; blades oblong; [weedy, mostly of coastal plain] _____ **S. floridana**
18. Plant rhizomatous, but not producing thick, tuberous thickening of rhizomes; blades elliptic, cordate; not weedy [higher elevations, mostly mountains, KY-TN-GA-AL-SC] _____ **S. nuttallii**
17. Plants not glandular on stems, leaves, and within inflorescence.
19. Calyx usually abundantly pubescent with stiff, eglandular hairs; fruiting calyx lobes straight, terminally apiculate _____ **S. hispida**
19. Calyx usually glabrous to sparingly pubescent; fruiting calyx lobes frequently curved or curling/retrorse, not at all or only weakly apiculate _____ **S. tenuifolia**

ACKNOWLEDGMENTS

I am grateful to Theo Witsell and other personnel of the Arkansas Natural Heritage Commission for sharing information from their files, and also personnel from the Oklahoma Natural Heritage Inventory, for similar help. I thank the US National Forest Service (Ouachita and Ozark National Forest units) for providing collection permits. Funding support for field work and for publication costs were provided through the W.T. Batson Endowment for the A.C. Moore Herbarium, USC. Kathleen Ross (Department of Languages, Literatures, and Cultures, USC) provided the Latin diagnosis. Johannes Stratmann (Department of Biological Sciences, USC) and Hartmut Hilger (Systematische Botanik und Pflanzengeographie, Frei Universität, Berlin) helped with the abstract. Clint Cook (Department of Biological Sciences, USC) provided, as usual, his constant help with the graphics and figures within this paper. Zack Murrell (BOON), Bert Pittman (South Carolina Department of Natural Resources), and Alan Weakley (NCU) graciously provided reviews on the manuscript.

I am especially grateful to George Johnson at the herbarium (APCR) of Arkansas Tech University, who was so accommodating in helping me with the field aspect of this work, and in introducing me to a new field pressing technique.

REFERENCES

- ARKANSAS NATURAL HERITAGE COMMISSION. 2005. State species of special concern – Plants. List available from Department of Arkansas Heritage, 1500 Tower Building, 323 Center Street, Little Rock, AR 72201. url: <http://www.naturalheritage.com/program/rare-species/>. Accessed July 2008.
- EPLING, C.C. 1934. Preliminary revision of American *Stachys*. Feddes Repert. Spec. Nov. Regni Veg. 80:1–75.
- FERNALD, M.L. 1943. Virginian botanizing under restrictions. *Rhodora* 45:357–516.
- FERNALD, M.L. 1950. Gray's manual of botany, 8th Edition. American Book Company, New York.
- GLEASON, H.A. 1952. Illustrated flora of the northeastern United States and adjacent Canada. New York Bot. Gard. New York.
- GLEASON, H.A. AND A. CRONQUIST. 1991. Manual of vascular plants of northeastern United States and Adjacent Canada. Ed. 2. New York Bot. Gard., New York.
- HARDIN, J.W. AND A.W. COOPER. 1967. Mountain disjuncts in the eastern Piedmont of North Carolina. *J. Elisha Mitchell Sci. Soc.* 83:139–150.
- İLÇİM, A., Ç. MENDERES, AND M.Y. DADANDI. 2008. *Stachys marashica* (Lamiaceae), a new species from Turkey. *Ann. Bot. Fenn.* 45:151–155.
- LITTLE, E.L. JR. 1970. Endemic, disjunct and northern trees in the southern Appalachians. In: Holt, P.C., ed. The distributional history of the biota of the Southern Appalachians. Part 2: Flora. Virginia Polytechnic and State University, Blacksburg. Pp. 249–290.
- MULLIGAN G.A. AND D.B. MUNRO. 1989. Taxonomy of North American species of *Stachys* (Labiatae) found north of Mexico. *Naturaliste Canad.* 116:35–51.
- NELSON, J.B. 1981. *Stachys* (Labiatae) in southeastern United States. *Sida* 9:104–123.
- NELSON, J.B. AND J.E. FAIREY. 1979. Misapplication of the name *Stachys nuttallii* (Lamiaceae) to a new southeastern species. *Brittonia* 31:491–494.
- OKLAHOMA NATURAL HERITAGE INVENTORY DATABASE. 2003. Working list of rare Oklahoma plants. List available from Oklahoma Natural Heritage Inventory, 111 E. Chesapeake Street, University of Oklahoma, Norman, OK 73019. url: <http://www.oknaturalheritage.ou.edu/>. Accessed July 2008.
- ROBISON, H.W. AND R.T. ALLEN. 1995. Only in Arkansas: a study of the endemic plants and animals of the state. University of Arkansas Press, Fayetteville.
- SMITH, E.B. 1994. Keys to the flora of Arkansas. University of Arkansas Press, Fayetteville.
- STEYERMARK, J.A. 1934. Some features of the flora of the Ozark region in Missouri. *Rhodora* 36:214–233.
- STRANGE, R.M. AND B.M. BURR. 1997. Intraspecific phylogeny of North American highland fishes: a test of the Pleistocene vicariance hypothesis. *Evolution* 51:885–897.
- ZOLLNER, D., M.H. MACROBERTS, B.R. MACROBERTS, AND D. LADD. 2005. Endemic vascular plants of the Interior Highlands, U.S.A. *Sida* 21:1781–1791.